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16. Abstract (MAXIMUM 200 WORDS) The present study explored the requirements for developing and documenting performance-based assessments that would conform to the amended <i>Seafarers' Training, Certification and Watchkeeping (STCW) Code</i> . The study had two major objectives: (1) specify and refine a method for developing performance-based assessments of mariner proficiency; and (2) develop an assessment for Automatic Radar Plotting Aid (ARPA) operator proficiency. A five-step method for developing performance-based assessments of mariner proficiency was created on the basis of a review of STCW requirements and the Instructional Systems Development literature, then applied in the development of an ARPA operator proficiency assessment. Overall, the proposed assessment development method was found to be useful in guiding the development of an objective and valid set of performance-based assessment procedures. It was recommended that future efforts be directed toward refinement of the method, development of additional assessment examples, and development of practical guidance and training for the maritime community.			
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EXECUTIVE SUMMARY

A research project to examine mariner assessment

The assessment of mariner proficiencies by practical demonstration is mandated by the International Maritime Organization (IMO) in its 1995 amendments to the *International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW Convention)* and the accompanying *Seafarer's Training, Certification and Watchkeeping Code (STCW Code)*. This requirement is a substantial departure from earlier practice, and methods for developing, conducting, and documenting such assessments must be established. The United States Coast Guard's (USCG) National Maritime Center (NMC) sponsored a research project through the USCG Research and Development Center (R&DC) to examine the implications of the mandate and to ensure that the best practices are available to the industry. The major objective of the project was to provide a systematic, step-by-step process for developing reliable and valid assessments and to investigate its feasibility for implementation.

Project efforts in this and subsequent phases

The efforts described in the present report were the first phase of the project. A team, consisting of researchers with expertise in training and assessment and marine educators, reviewed the requirements of the *STCW Code*, relevant USCG Navigation and Vessel Inspection Circulars (NVICs), Instructional Systems Development (ISD) literature, and the best practices of industry. From these sources, they distilled a systematic, step-by-step method for developing assessments. To test and refine the method and to provide a sample assessment, they applied it to a skill that is emphasized in the *STCW Code*, proficiency in the operational use of Automatic Radar Plotting Aids (ARPA). Their ARPA assessment procedure was designed for use on the United States Merchant Marine Academy's (USMMA) high-fidelity, real-equipment-based ARPA laboratory. The development methodology was successful, as documented herein.

This report first describes five steps to developing an assessment procedure: identify assessment objectives, determine assessment methods, specify the assessment conditions, define proficiency criteria, and prepare assessment objectives. This process is illustrated by following the research team members during their development of their ARPA procedure. Appendices contain the ARPA assessment objectives, the needed simulator exercises, instructions to the assessor and the candidate, and worksheets. Sufficient detail is provided to allow others to reproduce their procedures.

During this first phase of the project, the team identified several critical aspects of mariner assessment that merited further examination in subsequent phases. These additional aspects were examined in further investigations. The second phase involved the design of a systematic method to assist an instructor/assessor in evaluating the bewildering variety of available simulators, including personal computer (PC) based simulators, in their capability to support mariner assessments. This method is described

in another project report titled “Evaluating Simulators for Assessments of Mariner Proficiency.” Step-by-step support materials for a marine instructor in *developing* valid and reliable assessments without the assistance of training consultants were prepared with the participation of faculty from two state academies. The resulting workshop materials, a developer’s manual, and illustrative assessment procedures for deck and engine room are presented in a third report titled “A Method for Developing Mariner Assessments.” Lastly, researchers worked with a major shipping company to identify the special requirements of *conducting* over-the-shoulder assessments during commercial operations. The shipboard trials are described in a fourth report titled “Conducting Mariner Assessments,” which includes an assessor’s manual for the shipboard officer and sample assessments adapted for shipboard use.

Recommendations for Implementation of Project Findings and Products

For the most effective implementation of the project’s findings on performance-based assessment and its supporting products, the following USCG and industry actions are recommended:

- The USCG should encourage the maritime industry to use the performance-based assessment method, as described in the project reports and materials. As a first step, the materials in this report should be made widely available, on the USCG STCW website (<http://www.uscg.mil/stcw>) and through the National Technical Information Service (NTIS). When the industry becomes more familiar with the method, it can serve as the basis for a new NVIC. In addition, the USCG should submit the supporting materials to the IMO subcommittee on Standards for Training and Watchkeeping and recommend their further distribution.
- The USCG should encourage further familiarity with the performance-based assessment approach by USCG staff, as a tool for discussions of assessment with the industry and for the review of procedures submitted for approval.
- The USCG should encourage the review and use of the performance-based assessment method and materials by those groups who are dealing with the important technical issues of assessment. These groups include the Maritime Academy Simulator Committee (MASC), the Merchant Marine Personnel Advisory Committee (MERPAC), and academy committees appointed by the Maritime Administration (MARAD) to address STCW issues. The materials can provide a common approach and a common basis for discussion.
- Those in the industry who are responsible for training and assessment of mariner proficiency in academies, training schools, and shipping companies should make use of the performance-based assessment method and the materials presented here as a guide for their own development of assessment procedures. All the project materials are especially appropriate for inclusion in train-the-trainer courses. The developer’s manual and the assessor’s manual are also appropriate for those who do not take such courses.